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REMARKS

Claim rejections

Claims 1 and 3-9 have been rejected under 35 USC 102(b) as being anticipated by Stephenson (EP 526884). Claims 2, 10-21, 23-25, 28-31, and 36-39 have been rejected under 35 USC 103(a) as being unpatentable over Stephenson in view of Yamamoto (5,970,729). Claims 22 and 32-34 have been rejected under 35 USC 103(a) as being unpatentable over Stephenson in view of Yamamoto, and further in view of Ishikawa (6,511,146). Claim 35 has been rejected under 35 USC 103(a) as being unpatentable over Stephenson in view of Yamamoto, and further in view of Wimmer (4,662,622).

Claims 1, 16, 21, 28, and 31 are independent claims, from which the remaining pending claims ultimately depend. Claim 29 has been cancelled. Applicant submits that, as amended, claims 1, 16, 21, 28, and 31 are patentable over the cited prior art, such that all of the pending claims are patentable over the cited prior art.

Claimed invention as amended

Claims 1, 16, 21, 28, and 31 have been amended similarly, to more particularly specify their subject inventions. Claim 1 is discussed herein as representative of all the independent claims, such that insofar as claim 1 is patentable over the cited prior art, claims 16, 21, 28, and 31 are patentable for at least substantially the same reasons. Claim 1 as amended is thus now discussed in detail.

Claim 1 is limited to determining a property of air within an image-forming device, based at least on power supplied to a heating element of the image-forming device. The heating element of the image-forming device has been amended so that it is "*other than* an image-forming mechanism of the image-forming device." Support for this amendment is found in the patent application as originally filed at least in FIG. 4 and its related text in the detailed description. For

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instance, FIG. 4 shows an image-forming device in which there is an image-forming mechanism 402 that is separate from a fan assembly 406. (I.e., the image-forming mechanism 402 is in one box in FIG. 4, and the fan assembly 406 is in another box, such that it is readily apparent that the former is *other than* the latter.) The fan assembly 406 “can in one embodiment be the fan assembly 100 that has been described.” (P. 7, ll. 27-28) The “fan assembly 100 of FIG. 1 includes . . . a heating element 122.” (P. 2, ll. 29-30) Thus, the heating element is *other than* an image-forming mechanism. That is, there is a heating element, and there is an image-forming mechanism, where the heating element is separate from and not part of (i.e., “*other than*”) the image-forming mechanism.

Furthermore, the “air flow generated by an air-moving device” is “heated by the heating element” in claim 1. This air flow heated by the heating element is used “to dry colorant on the media applied within the image-forming device.” Support for this amendment is found in the patent application as originally filed at least in claim 22 and on page 3. For instance, claim 22 specifies that “the air-moving device is to generate the air flow to heat media to dry ink applied thereto within the image forming device.” Similarly, page 3 of the patent application as originally filed specifies that the “the air flow 110 . . . is then heated by the heating element 122 to result in heated air flow 110’, to heat media to dry ink applied to the media within the device.” (P. 3, ll. 5-7) Applicant uses the more general term “colorant” as including the ink that is specifically recited. For instance, drying colorant may include drying ink, fusing toner, which is another type of colorant, and so on.

Finally, claim 1 has been amended so that the one or more parameters of the image-forming device that are adjusted based on the property of air determined include “maintaining a consistent air mass flow by the air-moving device for heating functionality thereof.” Support for this amendment is found in the patent application as originally filed at least in claim 15, prior to amendment thereof. This claim prior to amendment recited such parameter adjustment including “maintaining a consistent air mass flow by the fan for heating functionality of the fan.”

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Therefore, claim 1 can be summarized in relevant part as follows. A property of air is determined based on at least the power supplied to a heating element of an image-forming device, where the heating element is "other than" an image-forming mechanism of the image-forming device. The air flow generated by an air-moving device is "heated by the heating element," and the resulting heated air flow is used "to dry colorant on the media applied within the image-forming device." The parameters of the image-forming device that are adjusted based on the property of air determined include "maintaining a consistent air mass flow by the air-moving device for heating functionality thereof."

Applicant submits that the cited prior art, either alone or in combination, does not render this claimed invention unpatentable. What follows is a discussion of the claimed invention as to Stephenson in particular, then as to Stephenson in view of Yamamoto, and finally as to Stephenson in view of Ishikawa. These latter two particular combinations are discussed since they are the most germane to the claimed invention as has been amended. That is, insofar as the Examiner has primarily relied upon these three references in teaching various aspects of the claimed invention, Applicant specifically discusses them, alone in the case of Stephenson, and in combination in the case of Yamamoto and Ishikawa, to explain why they do not render the claimed invention unpatentable.

Amended claimed invention vis-à-vis Stephenson alone

Applicant first discusses why Stephenson by itself does not render the claimed invention, as amended as described above, unpatentable. There are three reasons why Stephenson does not disclose the claimed invention. First, its heating element is not "other than an image-forming mechanism of the image-forming device," as to which the claimed invention is now limited. Second, Stephenson does not disclose "using the air flow heated by the heating element to dry colorant on the media applied within the image-forming device," as to which the claimed invention is now limited. Third, the parameters of the image-forming device are not adjusted in

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Stephenson such that they include “maintaining a consistent air mass flow by the air-moving device for heating functionality thereof,” as to which the claimed invention is now limited.

First, with respect to Stephenson not disclosing a heating element that is not *other than* an image-forming mechanism of the image-forming device, Stephenson in fact discloses the opposite: a heating element that *is* or is at least *part of* the image-forming mechanism of the image-forming device. The Examiner has identified the “thermal head” in FIGs. 1 and 2 of Stephenson as being the heating element in Stephenson. This is correct. For instance, Stephenson notes that “[d]uring printing, head 2 generates heat that must be removed to maintain its temperature at a desired level for optimum quality printing.” (Col. 7, ll. 33-35) The “thermal printing head 2 . . . has a plurality of elements . . . that are energized . . . *to generate images on a responsive imaging material*, . . . by heat transfer of thermally diffusible dye.” (Col. 7, ll. 17-25)

Thus, Stephenson’s heating element is not *other than* an image-forming mechanism, but actually *is* the image-forming mechanism. The printing head 2 “generates images,” and thus is an image-forming mechanism. Whereas the claimed invention is limited to a heating element “*other than*” an image-forming mechanism, Stephenson discloses a heating element that is indeed the image-forming mechanism. For this reason alone, Stephenson does not render the claimed invention unpatentable.

Second, with respect to Stephenson not using the air flow heated by the heating element to dry colorant on the media applied within the image-forming device, Stephenson’s heated air is simply exhausted from the device, and not used to dry colorant. As noted above, the heat generated by the head 2 is removed in Stephenson to maintain quality printing. Furthermore, Stephenson notes that “fan 12 . . . move[s] the air at a controllable flow rate . . . to remove from it heat generated by head 2.” (Col. 7, ll. 49-53) Stephenson’s heating element is not used for “heating functionality,” as in the claimed invention, but rather the heat generated by this element is undesired, and has to be exhausted. Thus, there is a “cooling system, such as a fan . . . so that the heat energy [is] removed.” (Col. 3, ll. 53-56) That is, Stephenson states that “[i]t is desirable to

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having a thermal printing device . . . and a method of operating such a device . . . to cool its printing head.” (Col. 3, ll. 19-22)

Therefore, Stephenson does not use the air flow heated by the heating element to dry colorant on the media, but rather simply exhausts this heated air. Whereas the claimed invention is limited to using the heated air flow to dry colorant on the media, Stephenson discloses the opposite, and simply exhausts the heated air. For this reason alone as well, Stephenson does not render the claimed invention unpatentable.

Third, with respect to Stephenson not “maintaining a consistent air mass flow by the air-moving device for heating functionality thereof,” Stephenson adjusts other parameters that are mutually exclusive with maintaining a consistent air flow mass. In particular, Stephenson instead ensures that “the average temperature of head 2 always remains constant at the constant enthalpy achieved by the control system.” (Col. 8, ll. 43-45) That is, more specifically, Stephenson states that

In effect, upon measuring the energy being fed to the head, and the mass flow rate of the cooling fluid and its temperature rise consequent cooling use, on an instantaneous basis, these measurements are applied on the same basis to adjust the cooling fluid flow rate *so that the net energy added to the head is substantially zero at any point in time.*

As a result, the average temperature of the head is maintained more constant than otherwise under a variety of printing and ambient conditions.

(Col. 4, ll. 2-15)

Therefore, Stephenson does not, and indeed *cannot*, maintain a consistent air mass flow for heating functionality, because it has to control air mass flow instead so that the average temperature of the heating element (i.e., the printhead) is maintained constant on average. More specifically, Stephenson does not, and *cannot*, maintain a consistent air mass flow for heating functionality, because it has a different function for controlling air mass flow, to ensure that there is “constant enthalpy.” This is a competing goal as compared to heating functionality. You

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cannot do both at the same time. For this reason alone, too, Stephenson does not render the claimed invention unpatentable.

Amended claimed invention vis-à-vis Stephenson in view of Yamamoto

Applicant notes that Stephenson, as has been described above, does not teach, disclose, or suggest three particular aspects of the claimed invention. That is, whereas the claimed invention is limited to (1) a heating element other than an image-forming mechanism, which (2) heats air flow to dry colorant, and where (3) a consistent air mass flow is maintained for heating functionality, Stephenson is directed to something else entirely. In particular, Stephenson is directed to (1) a heating element that is the image-forming mechanism, where (2) such heated air flow is exhausted to cool the heating element, such that (3) air mass flow is controlled so that on average the heating element's temperature is constant.

Modifying Stephenson in view of Yamamoto, however, still does not disclose the claimed invention. Like Stephenson, Yamamoto is directed to a "cooling apparatus." That is, like in Stephenson, in Yamamoto the goal is not to use the heating element to dry colorant, where a consistent air mass flow is maintained for heating functionality, but rather the goal is to cool the heating element, such that the air heated by the heating element is exhausted. Therefore, there is nothing in Yamamoto so that Stephenson can be modified in view of Yamamoto to render the claimed invention. In other words, insofar as Stephenson alone does not teach, disclose, or suggest the claimed invention, Stephenson in view of Yamamoto also does not teach, disclose, or suggest the claimed invention, because it teaches none of the three aspects of the claimed invention that are not found in Stephenson in the first place.

Amended claimed invention vis-à-vis Stephenson in view of Ishikawa

The Examiner has correctly noted that Ishikawa discloses an ink jet printing apparatus in which there is a supply source of dried warm air to dry ink applied to media by ink jet printheads

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(Office Action, p. 6, para. 3) However, the resulting combination of Stephenson in view of Ishikawa still does not render the claimed invention unpatentable, for at least two independent reasons. First, the resulting combination of Stephenson and Ishikawa still does not teach all the aspects of the claimed invention. Second, combining Stephenson and Ishikawa to result in the claimed invention destroys the intended functionality and principle of operation of Stephenson in particular, and thus represents an improper modification of Stephenson.

First, the resulting combination of Stephenson and Ishikawa does not teach all the aspects of the claimed invention, particularly a heating element "other than an image-forming mechanism of the image-forming device." Let us look at how one of ordinary skill within the art, without being guided by hindsight by using the claimed invention as a template, would combine Stephenson and Ishikawa. Stephenson teaches an image-forming mechanism that is a heating element, and teaches the exhaust of the air heated by this heating element. Ishikawa teaches that you can use heated air to dry the colorant applied to media by the image-forming mechanism.

Therefore, combining Stephenson with Ishikawa yields an image-forming device in which air is heated by an image-forming mechanism (which is the heating element), as in Stephenson, and then, rather than being exhausted, this heated air is instead used to dry the colorant applied to the media by the image-forming mechanism, as in Ishikawa. However, this combination does not yield the claimed invention, because the invention is limited to a heating element *other than* the image-forming mechanism. The logical combination of Stephenson with Ishikawa, as is accomplished by one of ordinary skill within the art without being guided by hindsight by using the claimed invention as a template, by comparison still teaches a heating element that is the image-forming mechanism, and thus is contrary to the claimed invention.

That is, combining Stephenson and Ishikawa without the benefit of using the claimed invention for guidance results in an image-forming device in which the air heated by the image-forming mechanism is used to dry the colorant applied to the media by the image-forming mechanism, instead of just being exhausted. There is no motivation to include a separate heating

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element in such an image-forming device, because that would add extra cost, and so on. Indeed, the only motivation to add a heating element *other than* the image-forming mechanism itself, as in the claimed invention, comes from the claimed invention. Therefore, for this reason alone, Stephenson in view of Ishikawa does not render the claimed invention unpatentable. The “prior art . . . references . . . must teach or suggest *all* the claim limitations” (MPEP sec 2143), which it does not need in relation to the present patent application.

Second, combining Stephenson and Ishikawa to result in the claimed invention indeed destroys the intended functionality and principle of operation of Stephenson. The claimed invention is limited to “maintaining a consistent air mass flow by the fan for heating functionality thereof.” By comparison, Stephenson alone has a differing control of air mass flow, for a differing functionality. As has been described above, Stephenson controls air mass flow not consistently for heating functionality, but rather controls air mass flow to ensure that there is “constant enthalpy,” so that on average the temperature of the heating element (i.e., the printhead) is constant.

Therefore, if you modify Stephenson in view of Ishikawa so that the goal of the heating element is for heating functionality, to dry the colorant applied to the media, and such that a consistent air mass flow is maintained, then you no longer are able to control air mass flow to ensure that on average the temperature of the heating element (i.e., the image-forming mechanism) is constant and thus to ensure “constant enthalpy.” That is, modifying Stephenson so that the heat generated by the image-forming mechanism is controlled to maintain consistent air mass flow for heating functionality as has been described, results in Stephenson not being able to control the cooling of this image-forming mechanism/heating element as indicated in Stephenson. More specifically, Stephenson can no longer ensure that the temperature of the mechanism/element is constant on average, and that there is “constant enthalpy,” when modified in view of Ishikawa.

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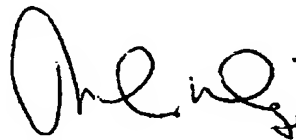
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Modifying Stephenson in view of Ishikawa, then, renders Stephenson unsatisfactory for its intended purpose, which is to maintain on average a constant temperature of the heating element in Stephenson, as well as "constant enthalpy." However, "the proposed modification cannot render the prior art unsatisfactory for its intended purpose." (MPEP sec. 2143.01) For this reason alone, as well, Stephenson in view of Ishikawa does not render the claimed invention unpatentable. Combining Stephenson with Ishikawa results in a prohibited and improper modification of Stephenson.

Conclusion

Applicants have made a diligent effort to place the pending claims in condition for allowance, and request that they so be allowed. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone Mike Dryja, Applicants' Attorney, at 425-427-5094, so that such issues may be resolved as expeditiously as possible. For these reasons, this application is now considered to be in condition for allowance and such action is earnestly solicited.

Respectfully Submitted,



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